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Information Technology Resources Board

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Project Management for Business Results

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What has changed?

- Yesterday – single program management
- Today → E-Govt Program management…
  - Changes cross domain/culture processes, technologies, and human interactions
  - Goals to achieve enterprise strategic vision thru multiple projects
  - Multi-agency change with citizen/supplier interactions

Current Trends

Customers need more and want to exploit best commercial practices.

- More "IT needed" than ever…more difficult than ever, and the consequences of failure are greater
- Agencies expect IT efforts to deliver value balancing efficiency and effectiveness
- Complexity levels are rising -- more technology choices at a faster pace of change
- Increased pressure to use COTS solutions (e.g., ERP II, HR, Financials)

Current Trends

Processes

And

People

- Staffing becoming increasingly important as costs rise and skill requirements change
- Use of contractors increasing as a percentage of total staff
- Experienced/skilled people are more scarce -- although the DOT.COM bust has helped

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11/06/02

OPM, CIO Council pushing project management out in front

By Jason Miller
GCN Staff

The Office of Personnel Management and the CIO Council are taking on the governmentwide shortage of project managers and solution architects by elevating these two positions above the generic term of computer specialist.

OPM by the end of the year will release agency guidelines on how to classify, recruit and certify IT project managers.

"E-government is consuming a lot of effort and resources across government and we need the right people to manage these projects," said Ira Hobbs, deputy CIO of the Agriculture Department

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Sponsorship Information and Announcements

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Most IT Project Failures are Management Related!

What can We do?

" Waiting for a successful project completion is about as thrilling as fishing, with the similar hope that something, sometime, somehow, will turn up. "

Project Management

- ***Application of knowledge, skills, tools and techniques to project activities to meet project requirements.***
- ***Addressing …***
  - **competing demands of scope, time, resources, cost, risk and quality**
  - **differing needs and expectations of Stakeholders**
  - **explicit and implicit requirements**
  - ***general management – planning, organizing, directing, and controlling.***

Project vs. Program

- **Project** -- a temporary mission undertaken to create a unique product or service. *Definite beginning and end*
- **Program** -- a group of projects managed in a coordinated way to obtain benefits not available from them individually (e.g., multiple releases, ongoing evolution, spiral developments)

Project vs. Program

Feature	Project	Program
Management Focus	Deliver on Time/Cost	Strategic Change
Breadth	Functional Domain	Across Enterprise
Manages	Schedule/Cost/Risk	Corporate Cost/Benefit
Scope	Well Defined/ Understood Begin/End	Evolving
Justification	Return on Investment	Strategic Improvement
Time Frame	3-15 Months	18-36 Months
Leadership	Motivate Team	Influence Enterprise
Change Focus	Reduce Ambiguity	Anticipate and Exploit Ambiguity
Links	Department/Agency	Projects

And IT Projects are different

Isn't it much like the process to build a building?

- Normally we start with legacy systems and business processes
  - Like "replacing an aircraft engine in-flight"
- Too often we start without a clear definition of the end state
- Customers/Users must be involved throughout and change will happen
- We must install, train, support, and modify long after building

Project Management Overview

Objective

Planning

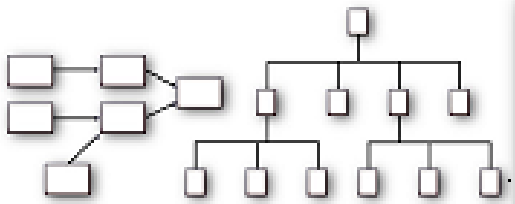
Requirements

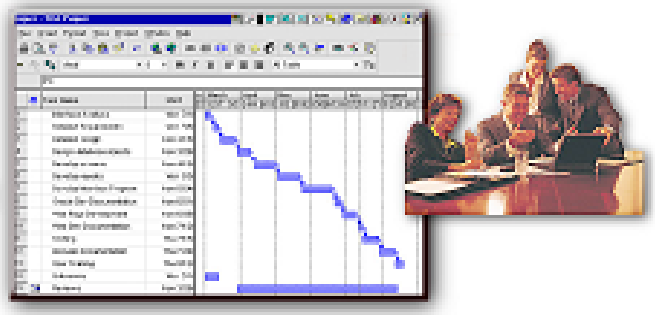
Technical Specification

WBS

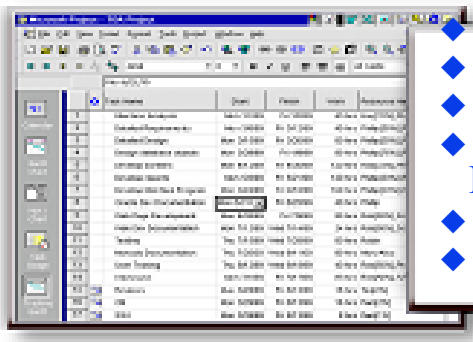
Schedule

Resources





Estimating

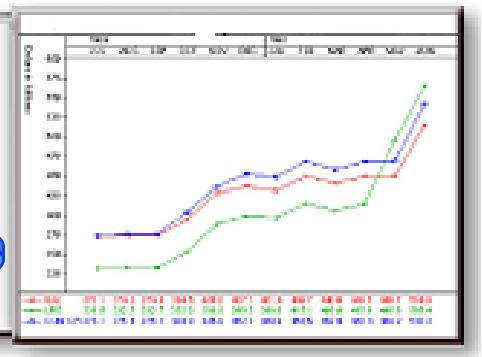


- Task Size
- Amount of Reuse and Integration
- SW and HW to be Used
- Estimation by Experts or Models
- Resources Required & Skill Mix
- Identify Personnel

Customer Acceptance

Execution/ Tracking

- Program Reviews
- Watch List Reporting/Tracking
- Performance vs Cost/Schedule Baseline
- Earned Value Reporting and Assessment
- Quality and Customer Satisfaction
- Feedback to Planning/Estimating for Historical Data



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IT Project Management Skills

- Leadership
- Project/Program Management
  - Cost Planning and Tracking
  - Resource and Schedule Negotiation
  - Contractor Relationship Management
- Process/Methodology Knowledge/Skills
- Business Process Knowledge
- Technology Understanding
- Ongoing Product, Process and Performance Measurement
- Change Management

Project Manager Training

Provide training in project management fundamentals for key managers

Requirements:	Definition, Work Breakdown Structure maintenance
Schedule Control:	Estimating, task sequencing
Personnel:	Roles, team motivation, conflict resolution
Communications:	Formal vs. informal, suitable sr mgmt. feedback
Risk:	Identify, avoid, impact of task/project delays
Quality:	QA vs. Quality Process
Cost:	Budgeting, resource utilization, earned value
Contractors:	RFP process, evaluation, contract admin.
Process:	Systems Development/Engineering Process

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Best Practices

- Projects must have specific business value from the start and let business goals drive functionality
- Get executive support up front to overcome resistance to change, be responsible for delivering benefits, and controlling project scope
- Assign a project manager with successful performance on comparable projects
- Involve end users throughout the project with explicit involvement of business experts
- Anticipate and plan for change and resistance to change
- Adhere to a moderately rigorous process used throughout the IT life cycle; use "just enough" methodology rigor to fit a project's needs; achieve process capability equivalent to at least CMM Level 2

Systems Engineering Process

GLOBAL PROCEDURES

Reviews

Contract Management

Configuration Management

Project Tracking & Oversight

Organizational Process Definition

Software Quality Assurance

Training

PRODUCT ENGINEERING PROCEDURES

Require-ments Evaluation & Proposal	Project Planning	Analysis	Design	Construct	Test	Install	Support	Complete

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CMM Level 2 Developer, PMO and Customer

Level 2 — Defined

- Requirements Mgmt
- Project Planning
- Project Tracking and Oversight
- Subcontract Mgmt
- Software Quality Assurance
- Configuration Mgmt

Level 3 —Repeatable

- Organization Process Focus
- Organization Process Def.
- Training Program
- Integrated Software Mgmt
- Software Product Eng.
- Intergroup Coordination
- Peer Reviews

Best Practices (Cont'd)

- Create a Work Breakdown for planning and tracking
  - Have meaningful deliverables -- frequently
- Create cost, schedule and performance baselines and update after each phase
- Use formal and proven tools and techniques to measure, monitor and track the project; treat project like a business with frequent status reports covering time spent on tasks, travel, expenses and delays
- Changes with impacts/ benefits approved by project sponsor
- Continuously test as you develop
- Invest in training to empower end users
- Use trained, experienced consultants where needed

Best Practices (Cont'd)

- Track 10-15 service level measures that will derive at least 35 percent of annual ROI

Software Related Metrics

Metric Category	Metric
Requirements Volatility	• Total number of requirements and actual requirement changes over time. • Total change requests over a period of time.
Software Size and Complexity Trends	• Function point count per build. • Planned and actual number of software units designed, coded, unit tested, and integrated over time. • Planned versus actual number of deliverables.
Software Defect Trends	• Number, age, and priority of Software Trouble Reports.
Software Effort Trends	• Planned versus actual hours by month. • Planned versus actual hours by subtask.
Schedule Performance Trends	• Completion of critical milestones and deliverables vs. planned.
Documentation Errors per Page	• Number of errors per page of each document compared to the SSG average per page

Monitor Risks

Metrics	Potential Outcomes
Target dates	Date extensions accumulate to more than two weeks
Scope	Any change in requirements — zero tolerance!
Resources	Resource increase/decrease more than 20 percent
Cost	Cost increases of 20 percent over estimate
Quality	Any reduction in testing or review of work efforts

"A Good System Can Not Be Built From Poor Requirements"

Requirements Definition Techniques

- Use a variety of techniques to derive well understood, testable requirements
  - Interviews
  - Use Cases
  - Storyboarding
  - Brainstorming
  - Prototyping

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Why did you not include these costs in the plan?

Don't Overlook Oft Forgotten Costs

- License Fees (purchase & upgrades/maintenance)
- Interfaces/integration (especially other's costs)
- Data conversion
- Technology infrastructure
- Life Cycle Documentation
- Consultants
- Business change
- Project management
- Training
- Testing (unit, system, integration, independent)
- Knowledge transfer to/from developer

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Don't Let This Happen….

What can I do to detect the problems earlier?

Inspect what you expect!

- Start with a perceived problem: "We need XYZ."
- Management approves an unrealistic business case while many are still asking "What is XYZ?"
- The task of implementing XYZ is dumped on a new XYZ project manager.
- A team is haphazardly thrown together.
- Money is spent like water used to put out a fire.
- It remains unclear as to what XYZ is to achieve.
- But it has to be done by yesterday.
- Management turnover occurs.
- Once rolled out, XYZ is not used.
- And you've wasted years of your career for nothing!

Earned Value

What is Earned value?

- A management concept based on detailed planning and actual performance measurement
- A quantitative measure of the work accomplished on the project .

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Why Earned Value?

- OMB Circular A-11 requires
  - monitoring/managing projects with an earned value approach
  - Agencies to submit Exhibit 300 business case that requires calculating the earned value for a project

Why Earned Value?

1. Simple management tool that relates cost, schedule and technical accomplishments into one set of metrics that provides early warning cost signals
2. Integrates with other software metrics
3. Yields measurements that are valid, timely, and auditable
4. Provides managers with information at a practical level of summarization
5. Establishes historical database for better future estimating and planning and assessing software development maturity

Terms

BCWS - Budgeted Cost of Work Scheduled aka "planned value"

BCWP - Budgeted Cost of Work Performed aka "earned value"

ACWP - Actual Cost of Work Performed aka "actual costs"

Terms

BAC - Budget At Completion (Total Budget)

EAC - Estimate At Completion (Final Costs)

CV - Cost Variance

SV - Schedule Variance

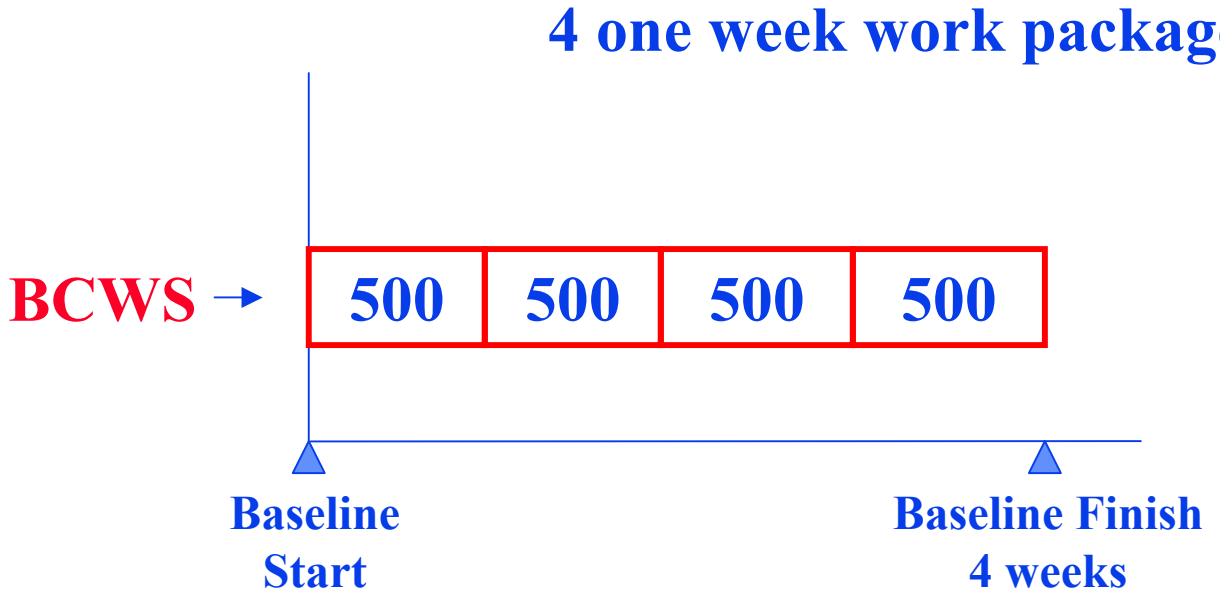
CPI - Cost Performance Index

SPI - Schedule Performance Index

EV Example

How many team members?

500/40=12.5?



Performance Measurement Baseline (PMB)

- Scheduled completion date(Baseline Finish) = 4 weeks
- Budget at Completion (BAC) = 2,000

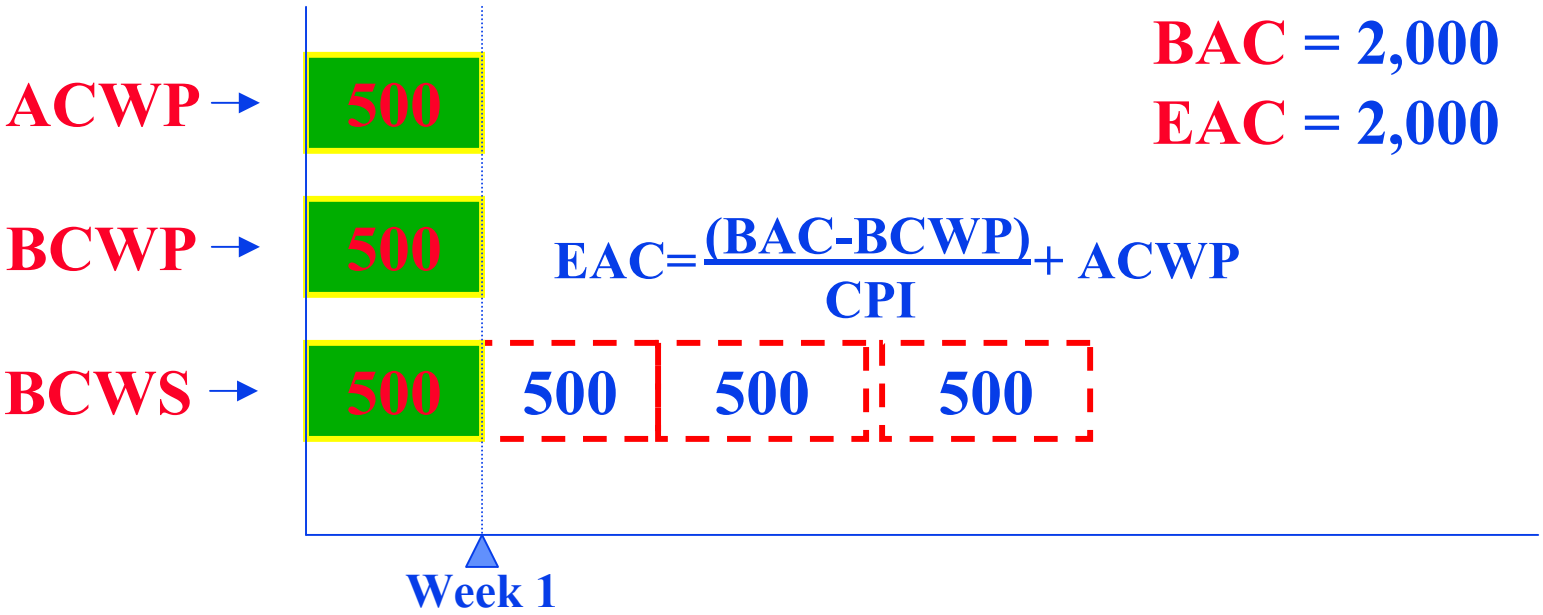
Answer

40 hours per work week per person
x .80 percent available as planning figure
(1,664 vice 1,560)

32 hours per work week per person for planning (40 hours per week for subcontractors)

500 hours / 32 hours = **15.6 persons**

End of 1st week
On track



BAC = 2,000

EAC = 2,000

$$EAC = \frac{(BAC - BCWP)}{CPI} + ACWP$$

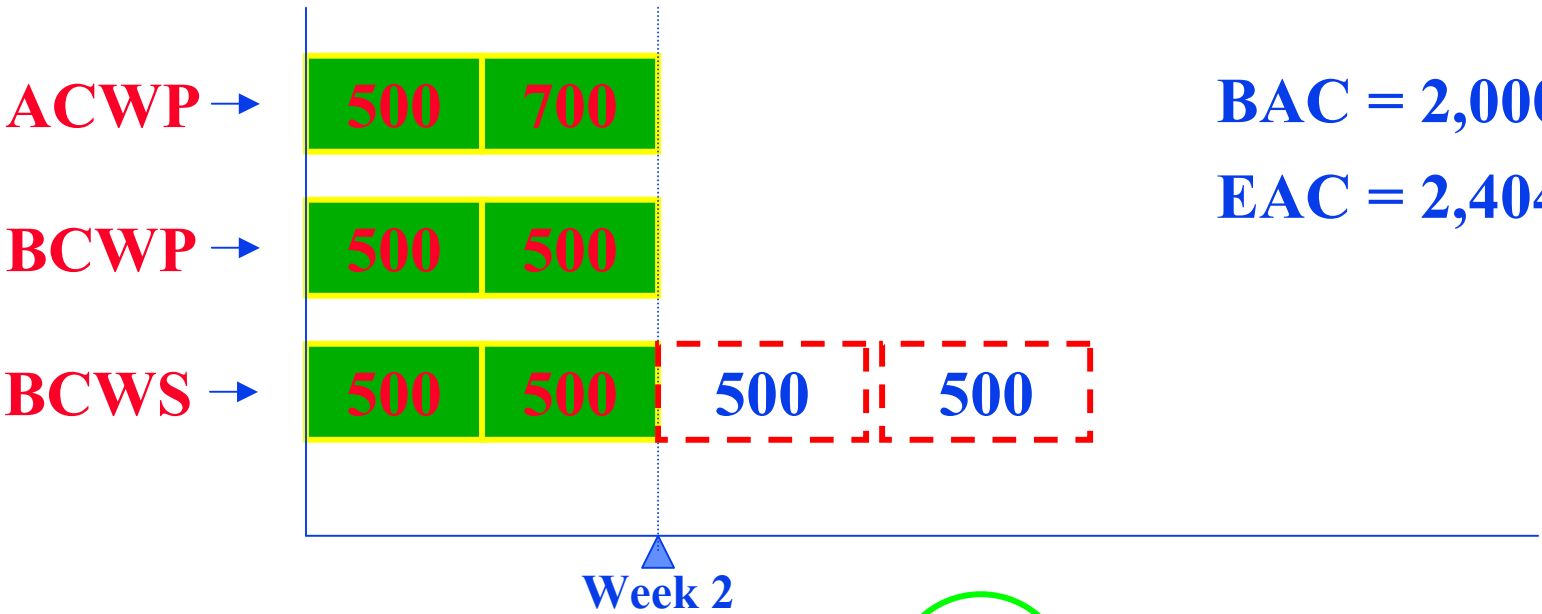
$$CPI = \frac{BCWP}{ACWP} = \frac{500}{500} = 1.0$$

CV = BCWP - ACWP = 500 - 500 = 0

$$SPI = \frac{BCWP}{BCWS} = \frac{500}{500} = 1.0$$

SV = BCWP - BCWS = 500 - 500 = 0

End of 2nd week
Cost overrun-schedule on track



BAC = 2,000

EAC = 2,404

$$CPI = \frac{BCWP}{ACWP} = \frac{1000}{1200} = .83$$

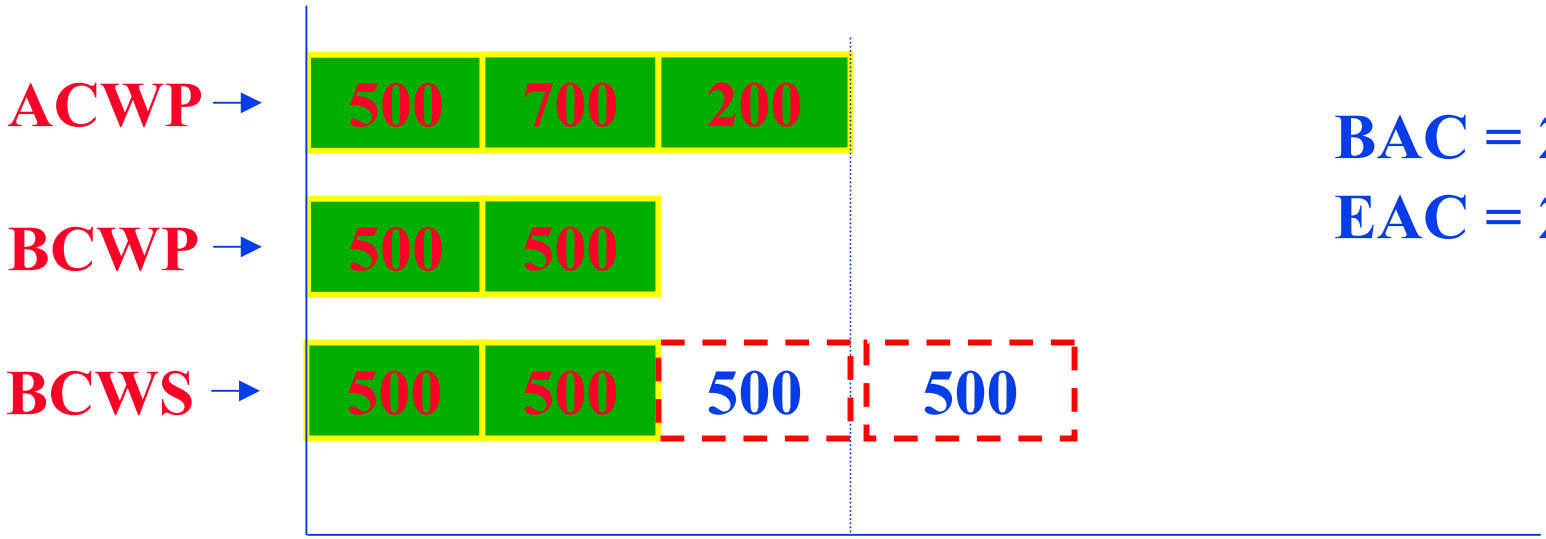
Shows absolute magnitude of overrun

$$CV = BCWP - ACWP = 1000 - 1200 = -200$$

$$SPI = \frac{BCWP}{BCWS} = \frac{1000}{1000} = 1.0$$

$$SV = BCWP - BCWS = 1000 - 1000 = 0$$

End of 3rd week
Schedule Overrun



BAC = 2,000

EAC = 2,808

$$CPI = \frac{BCWP}{ACWP} = \frac{1000}{1400} = .71$$

CV = BCWP - ACWP = 1000 - 1400 = - 400

$$SPI = \frac{BCWP}{BCWS} = \frac{1000}{1500} = .67$$

SV = BCWP - BCWS = 1000 - 1500 = -500

Completion
Cost & Schedule Improved

$$CPI = \frac{BCWP}{ACWP} = \frac{2000}{1900} = 1.05$$

$$CV = BCWP - ACWP = 2000 - 1900 = 100$$

$$SPI = \frac{BCWP}{BCWS} = \frac{2000}{2000} = 1.0$$

$$SV = BCWP - BCWS = 2000 - 2000 = 0$$

Variance Analysis

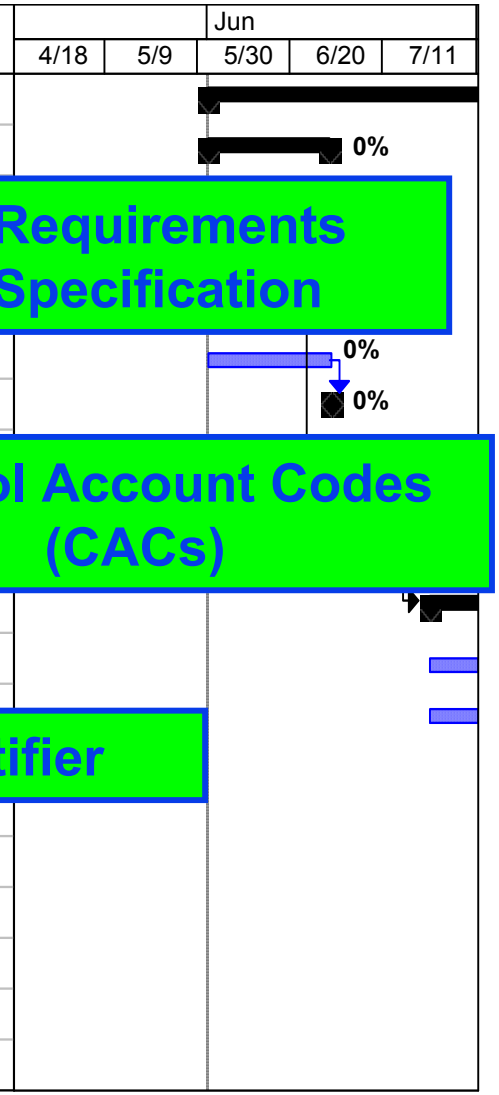
- Resources not available when needed
- New technology
- Better skills
- Overtime approved: affects both cost and schedule
- Incorrect estimates to begin with
- Requirements added, deleted, or modified (changes in project scope)
- Mischarging on the time card
- If bad: essentially that your risks have been realized
- More??

Sample WBS to level 5

LEVEL	WBS ELEMENTS	NEW	SUSTAINMENT
1	Automated Information System	X	X
2	Prime Mission Product	X	X
3	Hardware for Implementation	X	X
3	COTS Software for Implementation	X	X
3	Database	X	X
3	CSCI #1 (Use Name)	X	X
4	CSCI # 1 Integration Test Scripts and Peer Review Minutes	X	X
4	Module # 1(Use Name), Code and Peer Review Minutes	X	X
4	Module # 1 Test	X	X
5	Unit Test Script for Module #1 and Peer Review Minutes	X	X
5	Unit Test Report for Module #1	X	X

MS Project

ID	Text30	Unique ID	Task Name
1	ALLZ	1	**BCAS Release S990930**
2	PD00	31	**Project Planning Phase**
3		46	Config Control Board (CCB) designates FBL
4		218	Build release-level plans designate PMBL
5			**Analysis Phase**
6	AD10	59	Requirements Specification (RS)
7			Requirements Review (RR) designates ABL
8	DD00	85	**Design Phase**
9		220	Design documents (DD)
10		94	Critical Design Review (CDR) designates
11	CZ00	105	**Construction Phase**
12		109	Code, Peer Review & Unit Test
13	CT10	115	Unit Integration and System Testing (TD)
14		133	Test Readiness Rev II (TRRII) d
15	TZ00	145	**Testing Phase**
16			
17			
18		214	FCA and PCA designates PBL
19	IZ00	167	**Implementation Phase**
20	IZ20	171	Complete Release Package



Requirements Specification

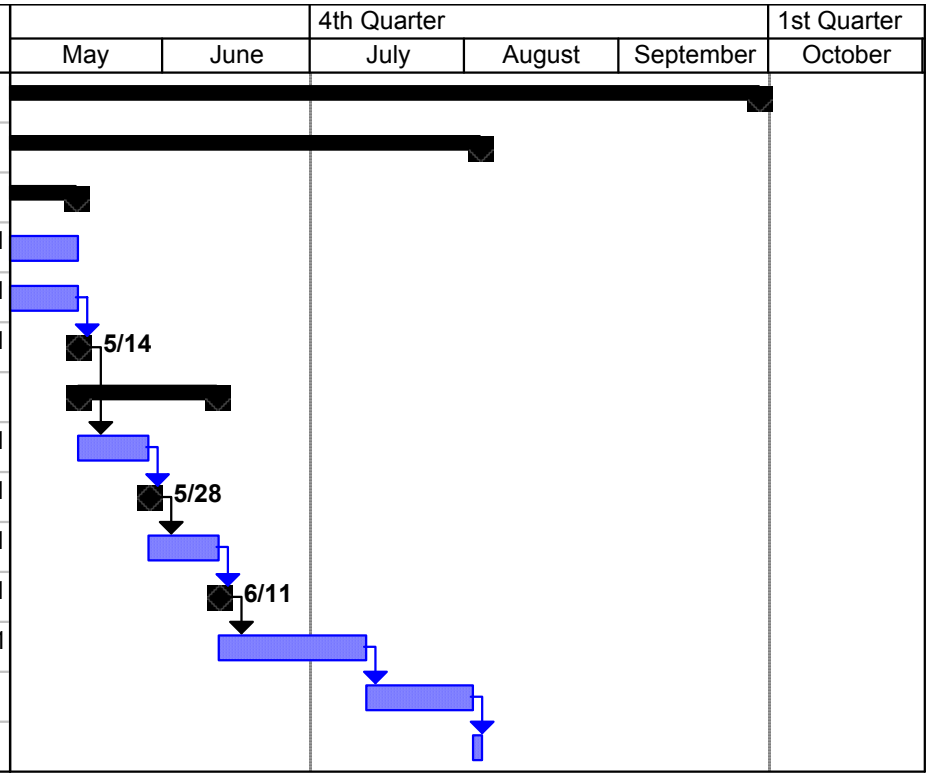
Control Account Codes (CACs)

Unique Identifier

Work Package Codes

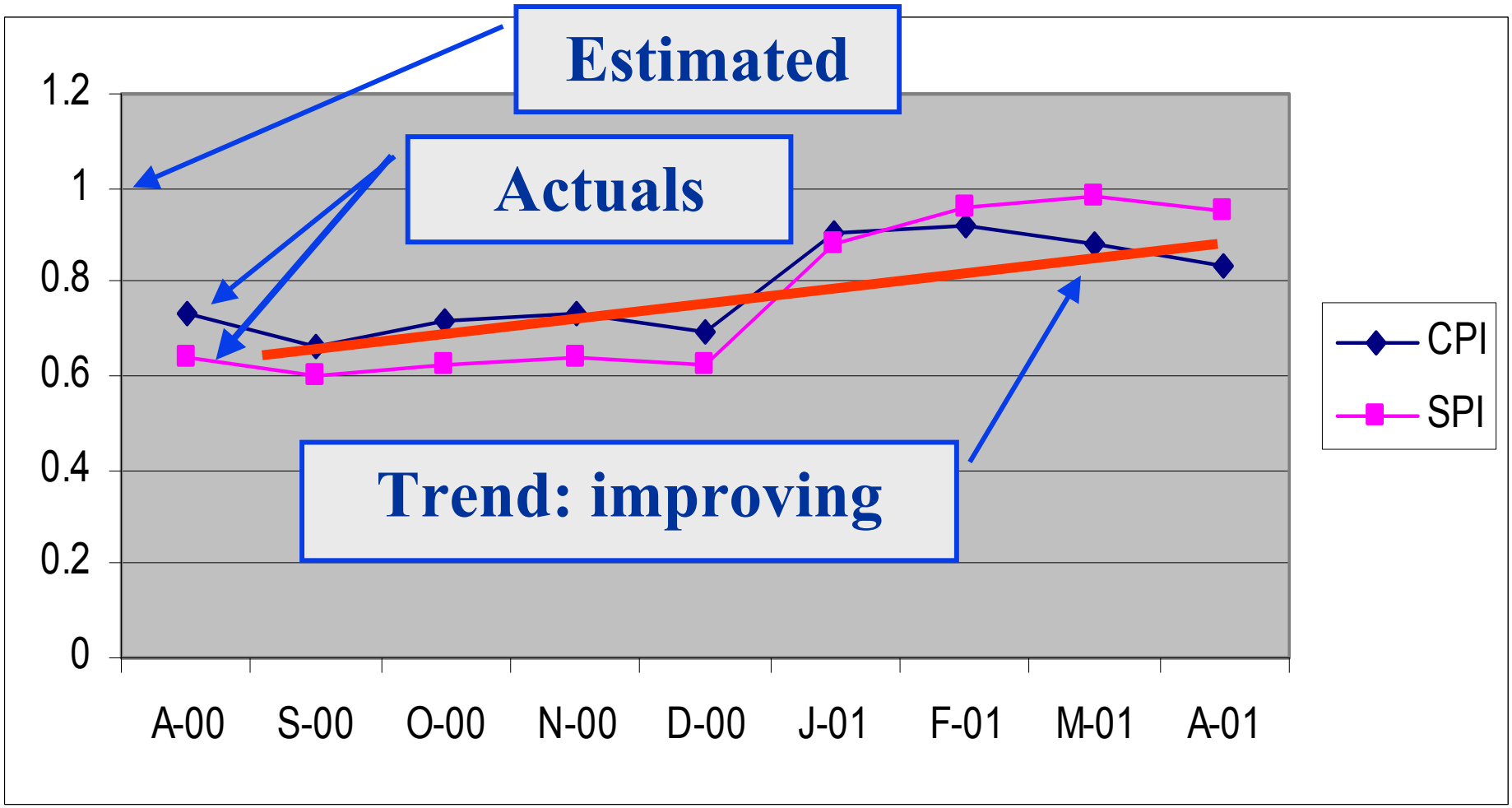
Resource-loaded, baselined schedule: The Performance Measurement Baseline

ID	Task Name	Start	Finish
1	**Build AU Registrar System**	**May 1 '01**	**Sep 28 '01**
2	**Build AU Spiral B**	**May 1 '01**	**Aug 3 '01**
3	**Analyze Requirements**	**May 1 '01**	**May 14 '01**
4	Evaluate Spiral A	May 1 '01	May 14 '01
5	Reverse Engineer into Desi	May 1 '01	May 14 '01
6	Requirements Review	May 14 '01	May 14 '01
7	**Design**	**May 15 '01**	**Jun 11 '01**
8	Build Preliminary Design	May 15 '01	May 28 '01
9	Preliminary Design Review	May 28 '01	May 28 '01
10	Complete Design	May 29 '01	Jun 11 '01
11	Critical Design Review	Jun 11 '01	Jun 11 '01
12	Construct	Jun 12 '01	Jul 11 '01
13	Test	Jul 12 '01	Aug 1 '01
14	Implement	Aug 2 '01	Aug 3 '01



PMB: **Baseline costs = $385K (DLC+ODC)**
Baseline schedule = 5 months

Institutionalization:
Actuals vs Estimates (36+/- Projects Reporting)



Benefits

- Encourages up front planning to obtain good estimates of cost and schedule.
- Quickly assess the state of large and complex projects.
- Measure progress in the same units as expenditures.
- Detect problems with schedule or budget. The historical trends are clearly visible.

Project Management Summary

Objective

Planning

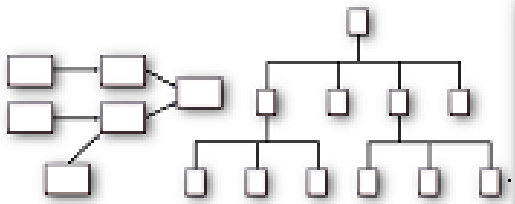
Requirements

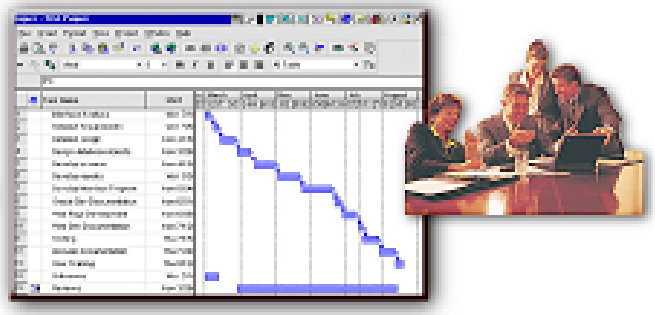
Technical Specification

WBS

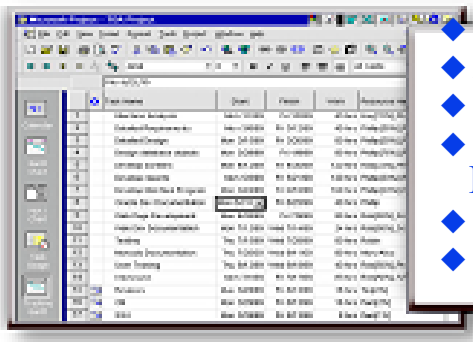
Schedule

Resources





Estimating



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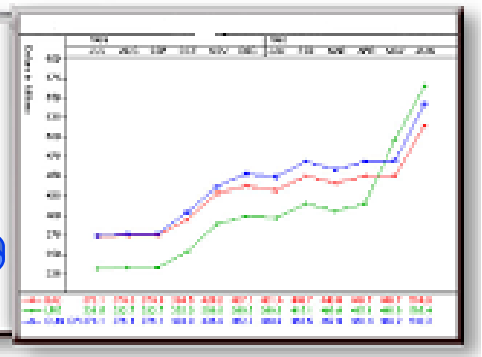

Basic Cost, Schedule and Performance Management

- Experienced, highly qualified Program Manager
- Experienced, capable team
- Proven subcontractor management processes
- Empirical cost and schedule estimates
- Proven schedule/performance management process
- Cost/Labor Accounting System
- Configuration management

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IT Cost, Schedule and Performance Management

- Well defined/understood, repeatable processes
- Requirements/Spec baseline and tracking
- Incremental deliveries every 6-12 months
- Metrics/Thresholds to track performance
- Risk management (mission & program)
- Interface definition, control and testing
- Continuous testing
- Earned Value tracking/reporting
- Know the capability maturity of the customer and the provider

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Questions?

I know I stand in the way of you going home! So, just in case:

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